

Mars & Multi-Planetary Electrical Environment Spectrum Analyzer (MENSA)

Completed Technology Project (2013 - 2014)



Project Introduction

In FY14, we will develop and deliver a Multi-Planetary Electrical Environment Plasma Spectrum Analyzer. This instrument is a DC and AC electric field sensor suite with many applications. For example, MENSA could be used to characterize electric charge present in dust storms and to discover the presence of lightning (and even audio thunder) in the Martian environment. In the long term, this instrument package can be used as a basis for low-power system for measuring planetary magnetospheres, plasma waves, and electrical fields for other missions.

Our objective is to develop MENSA as a highly integrated planetary radio and digital spectrum analyzer cubesat payload that can be deployed as a satellite instrument or reside on a rover. We will also develop the supporting signal processing algorithms to perform spectral analysis and event detection of the various environments that are sensed by the system.

The end goal is to deliver MENSA as a flexible, minimum Size Weight and Power (SWaP) system that for near-term Planetary Science. To save costs, the system will be developed using all commercial parts that have radiation tolerant flight part equivalents.

Anticipated Benefits

Advanced electronics for next generation space vehicles

Primary U.S. Work Locations and Key Partners

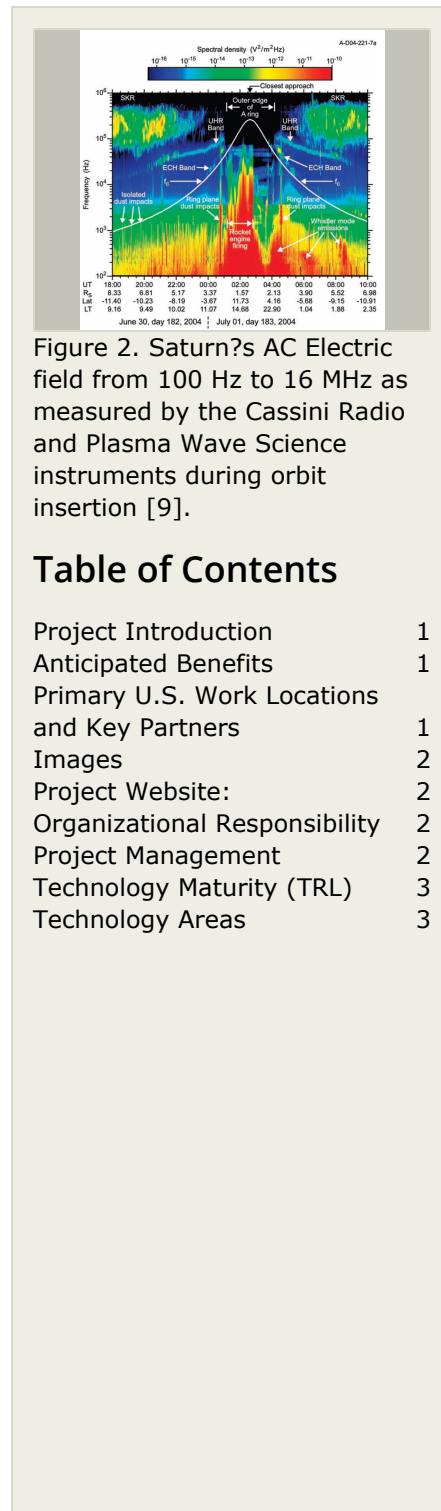
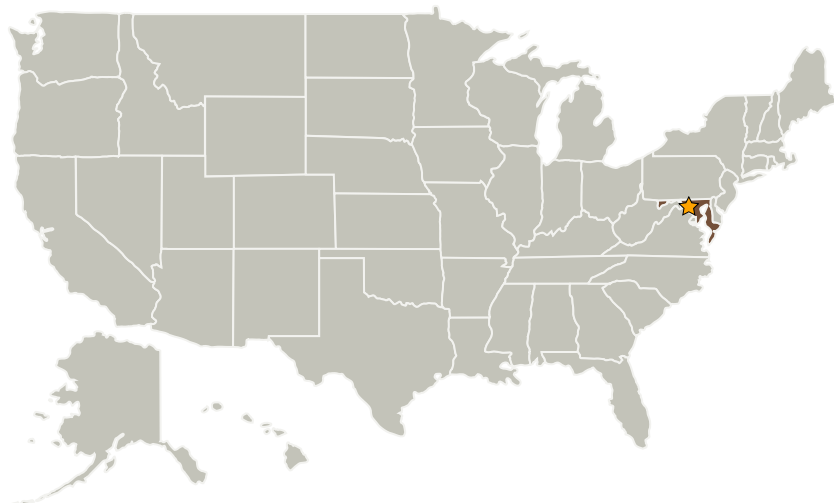


Figure 2. Saturn's AC Electric field from 100 Hz to 16 MHz as measured by the Cassini Radio and Plasma Wave Science instruments during orbit insertion [9].

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland

Images

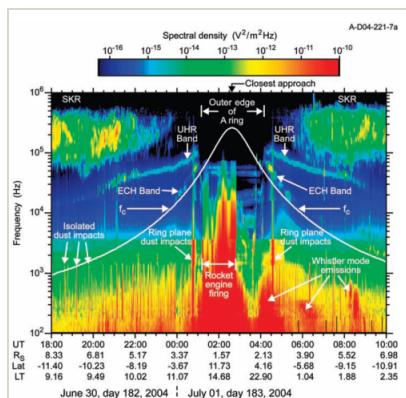
**Figure 2**

Figure 2. Saturn's AC Electric field from 100 Hz to 16 MHz as measured by the Cassini Radio and Plasma Wave Science instruments during orbit insertion [9].

(<https://techport.nasa.gov/image/2726>)

Project Website:

<http://sciences.gsfc.nasa.gov/sed/>

Organizational Responsibility**Responsible Mission Directorate:**

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management**Program Manager:**

Peter M Hughes

Project Manager:

Wesley A Powell

Principal Investigator:

Damon C Bradley

Co-Investigators:

Telana L Jackson

William M Farrell

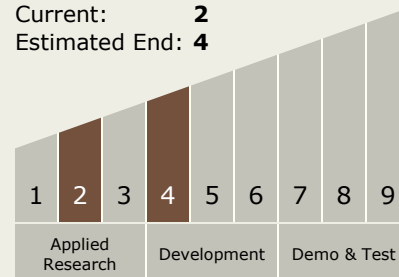
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Technology Maturity (TRL)

Start: 2
Current: 2
Estimated End: 4



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.5 Radiation
 - └ TX06.5.5 Monitoring Technology